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The averages as given above are collected in the following table:

Name.	Water.	Volatile.	Fixed carbon.	Ash.
Cherokee.....	1.94	36.77	52.45	8.84
Cherokee, (upper vein).....	2.08	35.32	48.64	13.96
Fort Scott.....	2.94	41.76	47.55	7.75
Leavenworth county.....	2.69	39.21	47.41	10.69
Linn county.....	2.07	39.42	46.89	11.62
Osage county.....	6.76	41.59	40.86	10.79
Franklin county.....	7.55	44.40	37.68	10.37
Cloud county.....	13.70	46.14	28.52	11.64
Pittsburgh, Pa.....	1.31	36.61	54.17	7.91
Nebraska.....	4.93	38.17	49.44	7.46
Warren county, Missouri.....	6.75	36.40	45.75	11.10

If the water and ash are eliminated in the calculation from the above results, as is suggested in a recent report of the Pennsylvania Geological Survey, the coals of Kansas will be divided into five groups. In the first group are included the Cherokee coals; in the second, Fort Scott, Leavenworth and Linn counties; in the third, Osage county; in the fourth, Franklin county; and in the fifth, Cloud county.

The coals found in the extreme southeast are richer in fixed carbon or coke, and this diminishes as we go toward the northwest. On the other hand, the volatile matter is more abundant compared with the fixed carbon in the upper or northern coals. There is uniformly more water in the Osage county coals and in those above it, than in the lower coals. In regard to ash, Cherokee and Fort Scott contain the least; the others contain from 10 to 12 per cent.

As the sulphur is so unevenly distributed, an analysis for this was not made. Previous examinations, however, show that there exists from 2 to 5 per cent. of sulphur. A part of this may be present in sulphate of lime, but much of it is united with iron in iron pyrites.

This examination was taken up for the purpose of preparing a report for the State Board of Agriculture. The specimens reported above are identical with those discussed by Prof. L. I. Blake, in the article on "The Evaporative Power of Kansas Coals," which appears at page 42 of this volume.

In conclusion, I wish to acknowledge the very valuable assistance afforded me by Mr. L. T. Smith, in the performance of a large part of the analytical work required in this investigation.

ON THE ECONOMIC VALUE OF CORN-COBS.

BY E. H. S. BAILEY, PH. D.

[Abstract.]

The importance of utilizing all possible varieties of fuel is most apparent in those parts of the country where fuel is scarce, so that the project to make use of any waste material in a prairie region is in the direction of greater economy.

Cobs bring a fair price as fuel in many towns in Kansas, but the chief difficulty with their use is that they are so rapidly consumed. Some time ago, in connection with E. L. Nichols, I made a few experiments on the possibility of obtaining gas from the cobs, and by this means getting the fuel in a concentrated form. By heating the ground cobs in a small iron retort, it was found that gas was readily made. This gas was not rich in those hydrocarbons which produce light, but contained more carbon monoxide (CO) and hydrogen. By passing this gas through gasoline or some

similar light hydrocarbon, it could readily be changed into illuminating gas. When this gas burns, no sulphur compounds are given off, and the products of the combustion would be only carbon dioxide (CO_2) and water. This process would only be of value where cobs were very cheap and abundant. If it were possible to heat the retort by means of the cob charcoal, or some other waste material, this would diminish the expense.

By burning the cobs in an open stove, it was found that they would yield a little over one per cent. of ash. This ash on analysis contained the following substances:

	<i>Per cent.</i>		<i>Per cent.</i>
Silica and insoluble residue.....	38.13	Sulphuric anhydride.....	1.40
Alumina.....	2.02	Chlorine57
Ferric oxide.....	3.91	Sodic carbonate.....	2.59
Phosphoric anhydride.....	5.27	Potassic carbonate	38.65
Calcic oxide	1.71	Moisture and carbon	traces,
Magnesic oxide.....	2.18		

The valuable materials in this ash are the phosphoric anhydride and the potassic carbonate. One thousand pounds of cobs would therefore yield ten pounds of ash, which would contain about one-half a pound of phosphoric anhydride, and three and eight-tenths pounds of potash. Ordinary wood contains from four-tenths to three and nine-tenths pounds of potash per one thousand pounds. Corn-stalks are very rich, containing seventeen and one-half pounds per thousand.

IS THE ALKALOIDAL STRENGTH OF TEA AN INDEX OF ITS COMMERCIAL VALUE?

BY PROF. L. E. SAYRE,
Department of Pharmacy, Kansas State University.

It will be seen from the title of this paper that the following chemical assay of some of the tea of the market was made with a view of ascertaining, if possible, the relation between alkaloidal strength and commercial value.

The popular belief is that the higher-priced teas are stronger in *theine* (alkaloid) than the cheaper grades. The following figures will serve to show the truth or fallacy of this belief.

For examination, eleven samples were selected, representative of some of the different brands upon the market. They were as follows:

1. Formoso Oolong.....	90 cents per lb.	7. Imperial.....	65 cents per lb.
2. Formoso Oolong.....	60 " " "	8. Gunpowder.....	70 " " "
3. Japan.....	70 " " "	9. Gunpowder.....	50 " " "
4. Japan.....	25 " " "	10. Tea dust, green.....	20 " " "
5. Young Hyson.....	70 " " "	11. Tea dust, dark.....	20 " " "
6. Young Hyson.....	40 " " "		

Ten grams of the powdered leaf were mixed intimately with two grams of calcined magnesia; the mixture, coarsely powdered, was treated with 100 cc. of boiling distilled water. The boiling was continued five minutes. The whole was transferred to a percolator, and the residue percolated with 50 cc. of boiling distilled water. The dregs were then returned to the beaker and boiled again with 100 cc. of water; transferred to a percolator, and then percolated until exhausted. The percolate was then evaporated on a water-bath to about 20 cc., and transferred to a separator. The alkaloid (*theine*) was then washed from this concentrated percolate by means of chloroform, using three or four portions of 25 cc., each successively, (the last washing leaving upon evaporation no residue.) The washings were then mixed and